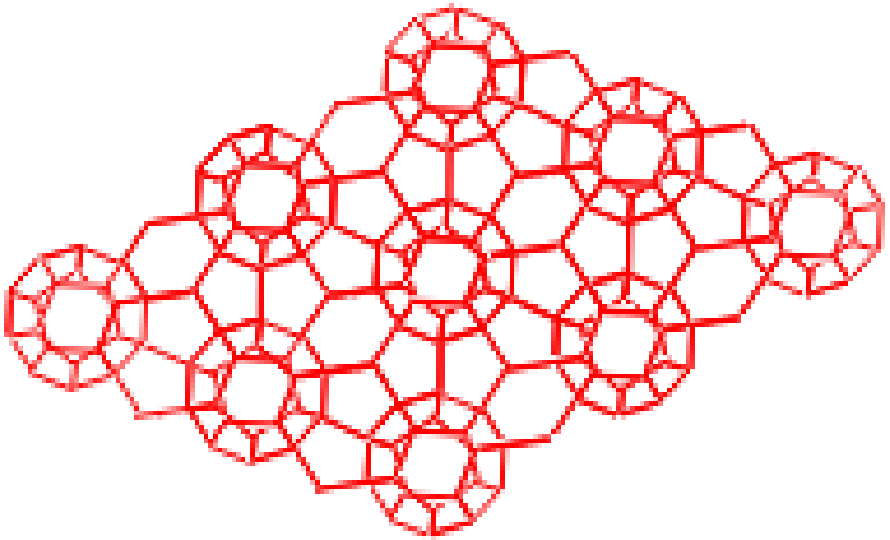
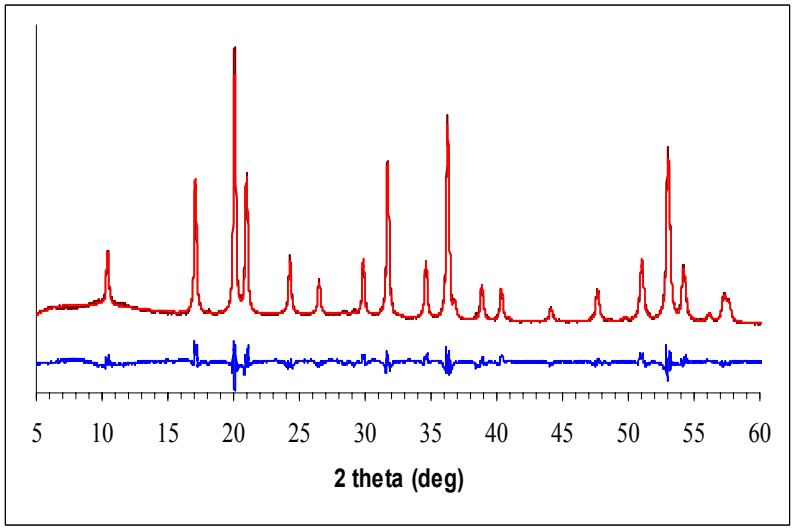
RUI: Acquisition of Desktop X-ray Diffractometer (#0216111)

Using desktop MMA diffractometer to control synthesis and purification processes [1], we have produced very pure samples of an open framework, wide band gap allotrope of silicon Si_{136}.

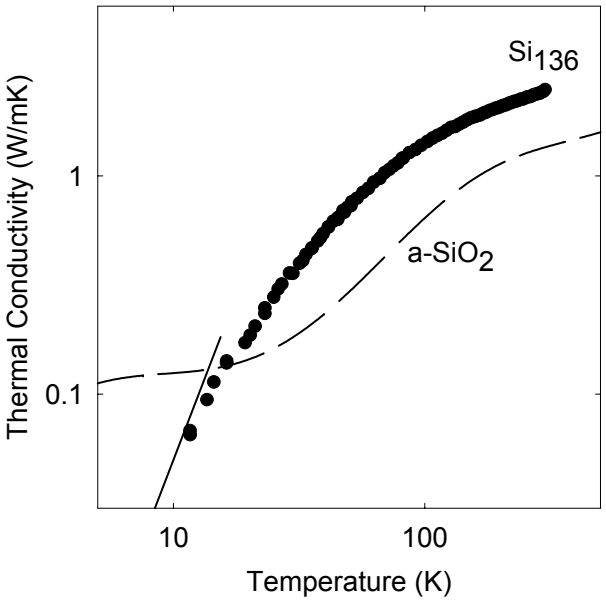


Open framework structure of Si_{136} .

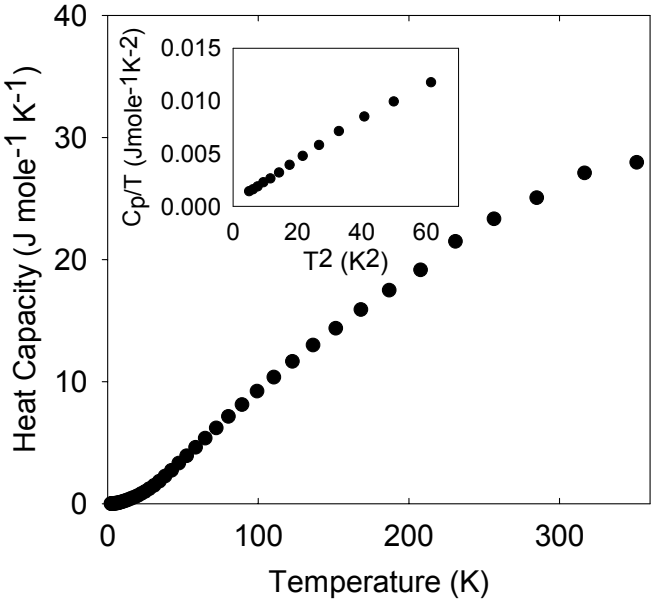


X-ray spectrum of very pure sample of Si_{136}. Difference between experimental and fitted spectra is shown as a blue line.

Si_{136} allotrope has very low thermal conductivity similar to the conductivity of amorphous silica [2]. Very low thermal conductivity and wide band gap make Si_{136} an interesting thermoelectric material.



Thermal conductivity of Si_{136} and amorphous SiO_2.



Heat capacity of Si_{136}. The insert shows that $C_p \sim T^3$ at low temperatures.

1. J. Gryko, US Patent 6,423,286; J. Gryko, *et al.*, Phys. Rev. B**62**, R7707 (2000).
2. G. S. Nolas, *et al.*, Appl. Phys. Lett. **82**, 910 (2003).